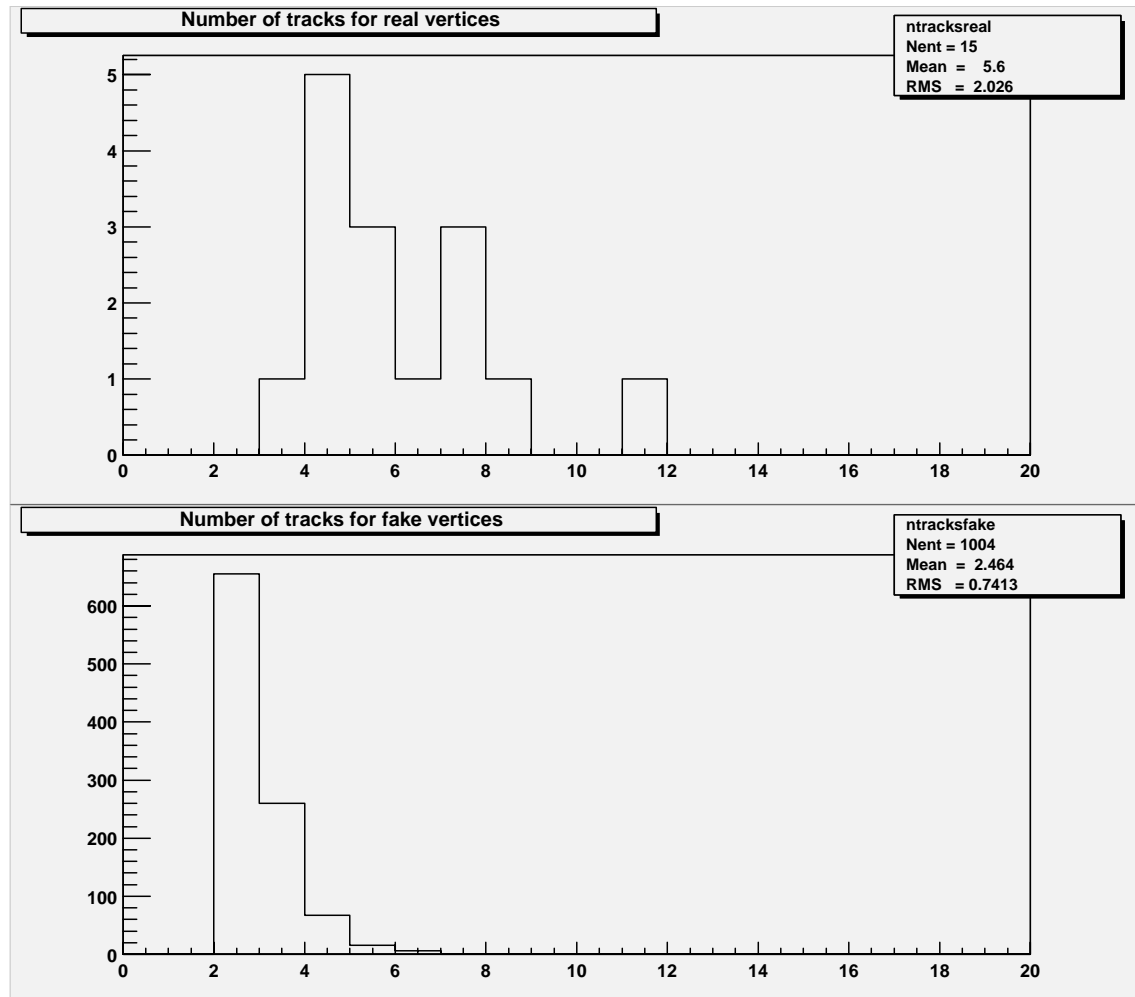# Vertex Location

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Fermi Lab 7/7/00

- I have not yet finished what I want to show tomorrow. However, in an effort to at least get some of what I have out so people can see it I will show here some histograms with brief explanations. These will be incorporated into my presentation tomorrow.

- I have carefully studied 19 already located events in order to continue improving my ability to locate vertices. The m_files I have used are files I made from the large "loc" emulsion data files. I used efscal_32. These events represent a subset (more than half) of events for which I have done a vertex search. The subset of events I consider here is defined by having at least one "good" spectrometer track. In this case I use a method of location which involves projecting the spectrometer track back into the emulsion and first searching for emulsion tracks which "match" the good spectrometer track(s). I had hoped to also present material from the other class of events (no "good" spectrometer track) , but I will not do that tomorrow.

- Of the 19 events I found the "real" vertex 18 times. Here are some histograms using 15 of the events (I am only using 15 for reasons I will explain tomorrow).
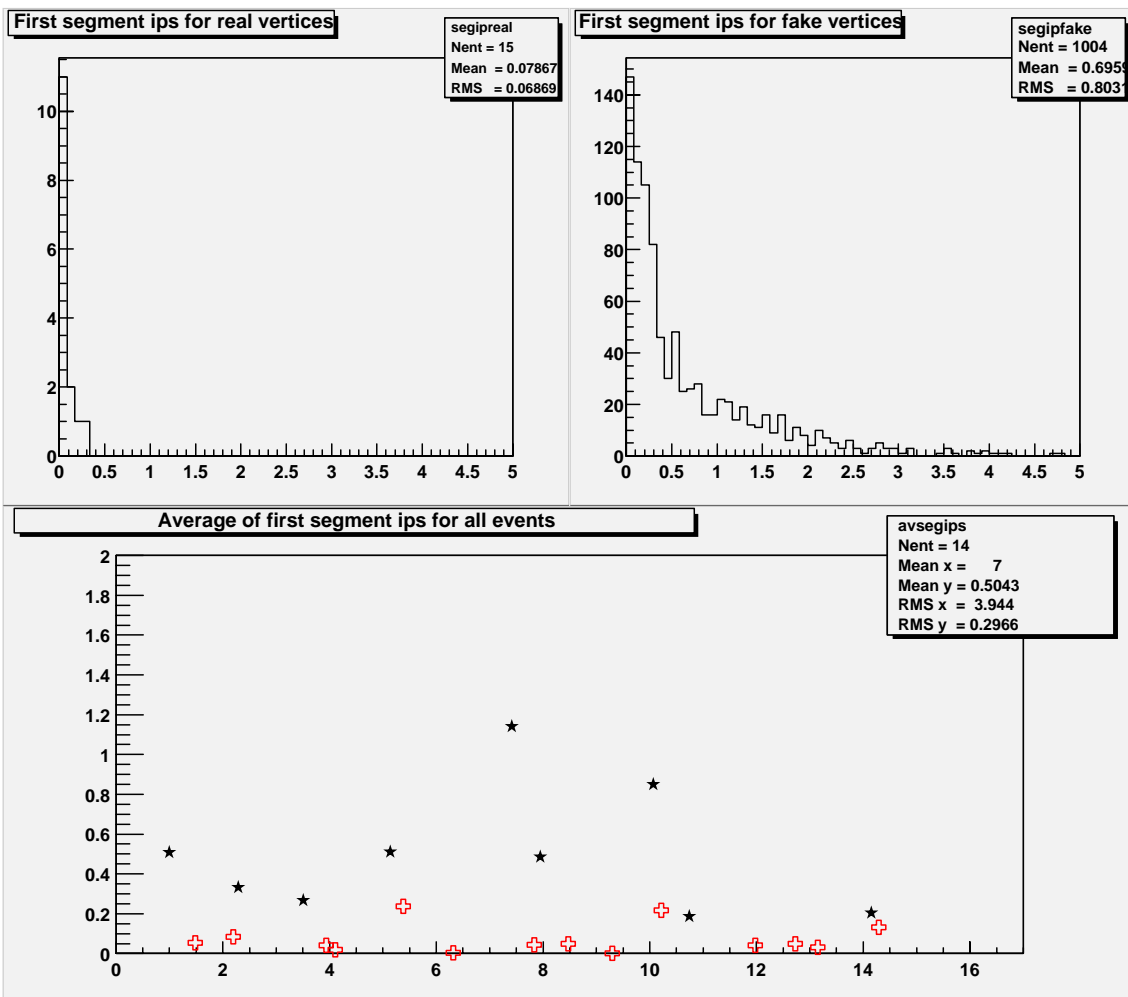
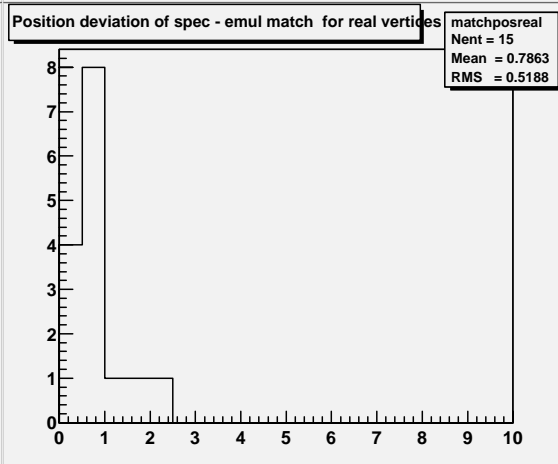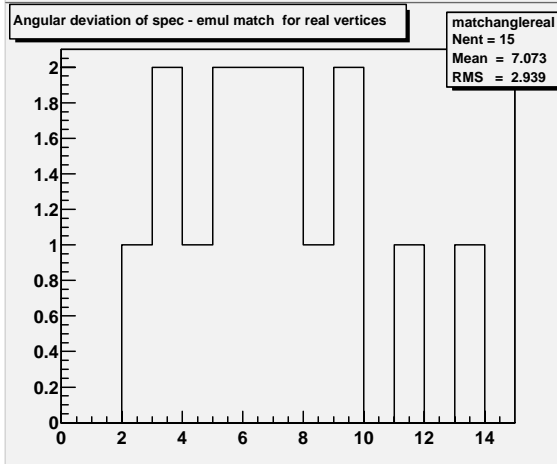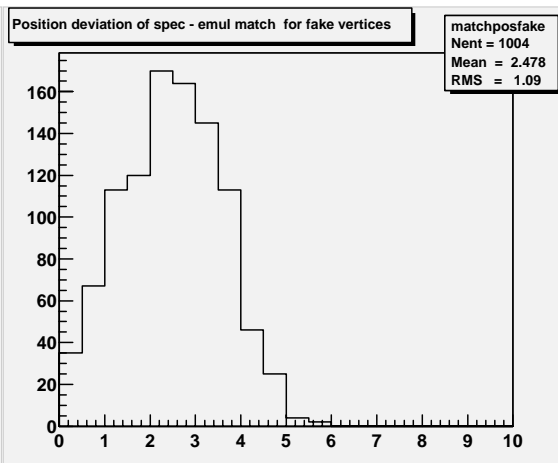Number of vertex tracks (including single segments) for
1)the correct vertex
2)all other vertices located in the 15 events (note that each event typically finds between 5 and 100 vertices)

- Next are histograms of the average impact parameter of the first segments for each vertex. The first two are pretty clear. I will explain the third one tomorrow.

First segment ips for real vertices

segipreal
Nent = 15
Mean = 0.07867
RMS = 0.06869

First segment ips for fake vertices

segipfake
Nent = 1004
Mean = 0.6959
RMS = 0.8031

Average of first segment ips for all events

avsegips
Nent = 14
Mean x = 7
Mean y = 0.5043
RMS x = 3.944
RMS y = 0.2966

- For this method of location, all emulsion tracks which start in the emulsion (ie not penetrating) are compared to an incoming spectrometer track. Each emulsion track which matches the spectrometer track well enough is then paired with all other emulsion tracks to search for vertices. Thus, by definition, every found vertex, real or fake, will have one track which "matches" the incoming spec track. Next I show how well the projected spectrometer track matches the emulsion track which was used to form the vertices.

Angular deviation of spec - emul match for fake vertices

matchanglefake
Nent = 1004
Mean = 9.746
RMS = 3.614

Position deviation of spec - emul match for fake vertices

matchposfake
Nent = 1004
Mean = 2.478
RMS = 1.09

Angular deviation of spec - emul match for real vertices

matchanglereal
Nent = 15
Mean = 7.073
RMS = 2.939

Position deviation of spec - emul match for real vertices

matchposreal
Nent = 15
Mean = 0.7863
RMS = 0.5188

- After forming all the possible vertices for an event I then compare the vertex tracks to lines which were formed in myanal. I take all combinations of u and v lines to form "ghost tracks" (of course some of them are the real ones). I then count the number of emulsion vertex tracks which match the ghost spec tracks. Each u or v line is only allowed to be used once for a vertex. In what follows what I mean by "average number of ghosts" is this: for a given event it is the average number of matches for all vertices in that event. (I will explain more about why I do it this way tomorrow). The histograms are of the number of ghost matches minus the average number of ghost matches .